Chapter 9
Alternatives to Take Considered and Rejected

The ESA requires that section 10(a)(1)(B) permit applicants specify in the HCP what alternative actions to the taking of Federally listed species were considered and the reasons why those alternatives are not proposed to be used (50 CFR §17.22(b)(1)(iii)(C)). The USFWS/National Marine Fisheries Service HCP Handbook (U.S. Fish and Wildlife Service/National Marine Fisheries Service 1996) identifies two alternatives commonly used in HCPs: 1) an alternative that would reduce take below levels anticipated for the proposed project and 2) an alternative that would avoid take and hence not require a permit from USFWS ("no-action alternative"). This chapter identifies alternative measures considered that would minimize or avoid the potential for take of each Federally listed species covered in this HCP. These measures were not included in the LCR MSCP Conservation Plan because they were determined not to be practicable.

9.1 River Operations and Water Conveyance Alternatives to Avoid the Taking of Listed Species

Alternatives were considered that would avoid or reduce take of razorback sucker, bonytail, southwestern willow flycatcher, and Yuma clapper rail that result from ongoing river operations and proposed future operations. These alternatives include modified operations of the LCR dams and construction of new water conveyance systems to reduce the adverse effects on these listed species.

9.1.1 Modify Operations of LCR Dams for Water Delivery and Power Generation

This alternative would involve the modification of present LCR dam operations in the delivery of 7.5 maf of water plus surplus flows and the generation of power to reduce the extent of stranding of razorback sucker and bonytail and to prevent the loss of habitat for razorback sucker, bonytail, southwestern willow flycatcher, and Yuma clapper rail that results from fluctuating river flows and declines in surface water elevations and groundwater elevations. Major dams on the LCR are, from north to south, Hoover Dam, Davis Dam, Parker Dam, Headgate Rock Diversion Dam, Palo Verde Diversion Dam, Imperial Dam, Laguna Dam, and Morelos Diversion Dam. Reclamation-operated

Hoover, Davis, and Parker Dams are the most influential structures on the LCR and are critical to controlling the flow patterns of river. The principal responsibilities of Reclamation in managing the LCR are:

- flood control, improvement of navigation, and river regulation;
- storage and delivery of Colorado River water for reclamation of lands and municipal, industrial, and other beneficial purposes; and
- generation of electrical power.

Reclamation is also responsible for deliveries of Colorado River water to Mexico under the 1944 Water Treaty.

Existing physical conditions restrict the ability of Reclamation to modify operations of LCR dams to avoid or minimize take. For example, controlled releases from Hoover Dam are limited to approximately 73,000 cfs, controlled releases from Davis Dam are limited to 44,000 cfs, and controlled releases from Parker Dam are limited to 22,600 cfs. Limitations on controlled release levels limit the ability to create peak flows similar to historic, predam conditions of approximately 120,000 cfs. The existing dams along the LCR have altered sediment transport characteristics of the river, which has resulted in the lowering of the river bed and water surface, thereby substantially increasing the flows needed to achieve overbank flooding that would benefit riparian habitat. Hydrologic and hydraulic analyses by Reclamation indicate that flows of 50,000 cfs are the threshold for overbank inundation for most of the undeveloped portions of the LCR (areas with natural or unarmored banklines). These physical limitations of the existing facilities and river channel restrict the extent to which river operations can be modified to benefit razorback sucker, bonytail, southwestern willow flycatcher, and Yuma clapper rail.

The Law of the River severely constrains Reclamation's flexibility in operations of its dams on the LCR. Actions by Reclamation in the operation of LCR dams are, for the most part, nondiscretionary. A detailed description of Reclamation's discretionary and nondiscretionary actions on the LCR is provided in Chapter 2 of the LCR MSCP BA, the companion document to this LCR MSCP HCP. The LCR MSCP Conservation Plan includes measures (see conservation measure RASU7) by which Reclamation will conduct discretionary actions to continue existing operations on Lake Mead and Lake Mohave that minimize take and benefit razorback sucker and bonytail during the term of the LCR MSCP. The constraints imposed on Reclamation by the Law of the River are such that discretionary modifications to present operations could not be implemented that would result in avoidance or substantial reduction in take of razorback sucker, bonytail, southwestern willow flycatcher, or Yuma clapper rail. No practicable means exists for Reclamation to modify operations of LCR dams to avoid take of these species.

9.1.2 Construct New Water Conveyance Systems for Water Transfers

This alternative would involve the construction of new conveyance facilities to reduce the extent of stranding of razorback sucker and bonytail on the LCR and to prevent the loss of habitat for razorback sucker, bonytail, southwestern willow flycatcher, and Yuma

clapper rail that results from declines in surface water elevations and groundwater elevations in the LCR MSCP planning area. The proposed future changes in points of diversion of up to 1.574 maf of LCR flow are needed to accomplish water transfers in California, Arizona, and Nevada. These changes in points of diversion from downstream to upstream locations would result in surface water and groundwater declines in Reaches 3–5. As an alternative to changing the points of diversion on the LCR, existing points of diversion could be used to accomplish water transfers if new water conveyance facilities were constructed. For example, the transfer of water from IID to SDCWA, as proposed, would be implemented by changing the point of diversion from Imperial Reservoir to Lake Havasu such that water can be conveyed via the Colorado River Aqueduct to SDCWA. This covered activity is expected to result in surface water and groundwater declines in Reaches 4 and 5 that would result in take of razorback sucker, bonytail, southwestern willow flycatcher, and Yuma clapper rail. The existing diversion at Imperial Reservoir could be used to deliver water to SDCWA if the AAC was extended to reach SDCWA facilities in San Diego. Considering the substantial logistical difficulties and high cost of tunneling and lifting this water across the Peninsular Ranges and the potential for take of additional ESA-listed species (in desert and coastal southern California) to extend the AAC in comparison to using the existing Colorado River Aqueduct, this alternative was rejected as not practicable.

It is not possible to analyze the feasibility of extending existing conveyance facilities in Arizona and Nevada to avoid impacts associated with the change in points of diversion. No specific transfers have been identified at this time, so the physical location of the source and the destination of Colorado River water that may be transferred in the future is uncertain. Additional information about the physical, legal, and cost constraints of alternative strategies cannot reasonably be evaluated without additional information.

9.2 Alternative Measures to Avoid the Taking of Southwestern Willow Flycatcher

The primary mechanism resulting in impacts on southwestern willow flycatcher is the decline in groundwater that adversely affects moist soils and ponded water that support flying insect prey abundance, the vegetative composition and structure that support nesting habitat, and the regeneration of vegetation that supports habitat. This potential loss of habitat could result in harm (i.e., death or injury) to southwestern willow flycatcher and hence could constitute take. An alternative measure that would minimize or avoid take of southwestern willow flycatcher is to prevent groundwater decline by supplementing existing habitat sites with irrigation water. This measure would require the engineering of most or all southwestern willow flycatcher habitat identified as potentially affected by covered activities. Engineering methods would include pumps, irrigation pipe, and appurtenant facilities. Most sites would require the construction of access roads and electrical connections to operate the irrigation systems. Irrigation would be managed by maintenance staff to ensure proper timing of supplemental water application. This approach to avoiding take of southwestern willow flycatcher will be implemented under the LCR MSCP Conservation Plan at Topock Marsh where large patches of willow flycatcher habitat are supported and water management infrastructure is present. At Topock Marsh, existing pump and delivery facilities will be improved to

address potential lower river and groundwater levels and ensure that impacts on willow flycatcher habitat are avoided.

This alternative to the take of southwestern willow flycatcher was rejected based on logistical, cost, legal, and effectiveness considerations. While some existing flycatcher habitat may be accessible for establishing irrigation systems (e.g., Topock Marsh), many of these habitat sites are small patches with no present access or electrical connections. The logistics of providing access and electrical connections for pumping equipment to all habitat patches is impractical and would likely result in substantial impacts on biological and other resources. Land ownership patterns may also prevent access. The inefficiency of developing the infrastructure, providing staff, and paying for water for a large number of small sites would be prohibitively expensive relative to concentrating habitat into a smaller number of larger sites. Southwestern willow flycatcher habitat patches are widely distributed across the LCR and pumping water directly from the adjacent river may not be feasible in some locations. Each habitat site will have a unique set of topographic, hydrologic, soil, and vegetation characteristics, and in many cases it is likely that irrigation water would not be effective in preventing impacts on habitat.

9.3 Alternative Measures to Avoid the Taking of Yuma Clapper Rail

The primary mechanism resulting in impacts on Yuma clapper rail is the decline in surface- and groundwater that adversely affects marsh and open water habitats that support this species. This potential loss of habitat could result in harm (e.g., death or injury) to Yuma clapper rail and hence could constitute "take" under the ESA. An alternative measure that would minimize or avoid the take of Yuma clapper rail is to prevent surface- and groundwater decline by supplementing existing habitat sites with water. This measure would require the engineering of most or all Yuma clapper rail habitat identified as potentially affected by covered activities. Engineering methods would include pumps, conveyance pipe, and appurtenant facilities. Most sites would require the construction of access roads and electrical connections to operate the pump systems. Pumping would be managed by maintenance staff to ensure proper timing of supplemental water application. This approach to avoiding take of Yuma clapper rail will be implemented under the LCR MSCP Conservation Plan at Topock Marsh where large patches of rail habitat are supported and water management infrastructure is present. At Topock Marsh, existing pump and delivery facilities will be improved to address potential lower river and groundwater levels, and ensure that impacts on Yuma clapper rail habitat are avoided.

This alternative to the take of Yuma clapper rail was rejected based on logistical, cost, legal, and effectiveness considerations. While some existing Yuma clapper rail habitat may be accessible to provide supplemental water (e.g., Topock Marsh), many of these habitat sites are small patches with no present access or electrical connections for pumping equipment. The logistics of providing access and electrical connections to all habitat patches is impractical and would likely result in substantial impacts on biological and other resources. Land ownership patterns may also prevent access to habitat sites. The inefficiency of developing the infrastructure, providing staff, and paying for water

for a large number of small sites would be prohibitively expensive relative to concentrating habitat into a smaller number of larger, accessible sites. Yuma clapper rail habitat patches are widely distributed across the LCR and pumping water directly from the adjacent river may not be feasible in some locations. Even at habitat sites where pump systems could be established, it is not certain that supplemental water would be sufficient to offset the adverse effects on habitat of declining surface and ground water. Each habitat site will have a unique set of topographic, hydrologic, soil, and vegetation characteristics and, in many cases, it is likely that supplemental water would not be effective in preventing impacts on habitat.

9.4 Alternative Measures to Avoid the Taking of Razorback Sucker, Bonytail, and Flannelmouth

The primary mechanism potentially resulting in the take of razorback sucker, bonytail, and flannelmouth is the loss of river and backwater habitats as a result of reductions in flow in Reaches 3–5 from proposed changes in points of diversion. In addition, these fish may be removed from the river through diversions and separated from their populations. To avoid flow reductions resulting from changes in points of diversion, an alternative to the take of these fish species considered is not to change points of diversion from downstream to upstream locations. This alternative would not meet the project purpose and is therefore rejected.

Impacts on fish resulting from diversions could be minimized by installing fish screens at all diversions. This alternative to the take of fish was rejected because installing fish screens on the large number of diversions from the LCR is prohibitive given the high cost and minimal benefit of the endeavor. The available fish screen technology would not prevent entrainment of larvae, the life stage likely most vulnerable to entrainment. Given the small proportion of the population potentially exposed to diversions (i.e., movement by the points of diversion), the level of mortality attributable to other factors (e.g., egg, larval, and juvenile predation), and unavoidable entrainment of the vulnerable larval life stage, fish screens would not benefit the species population to any measurable degree.

9.5 Alternative Measures to Avoid the Taking of Humpback Chub

The humpback chub has been extirpated from the LCR below Hoover Dam. Based on efforts to recover the humpback chub in the Colorado River upstream of Lake Mead, however, humpback chub could potentially inhabit transitory river segments of the Colorado River within the full-pool elevation of Lake Mead. The mechanism that could result in take of humpback chub is the periodic loss of transitory Colorado River segments that form in Lake Mead (and could be occupied by humpback chub when it is below full-pool elevation) and that are subsequently inundated when reservoir elevations rise. The number of humpback chub that could be affected over the term of the LCR MSCP, however, is expected to be relatively small. Impacts on the humpback chub could be minimized by changing reservoir operations. However, for the reasons described in

Section 9.1.1, "Modify Operations of LCR Dams for Water Delivery and Power Generation," this alternative is not considered practicable.

9.6 Alternative Measures to Avoid the Taking of Desert Tortoise

Covered activities under the LCR MSCP HCP, in combination with the implementation of the LCR MSCP Conservation Plan, are expected to result in some low, unquantifiable, level of direct mortality of individuals of desert tortoise associated with operation of vehicles and equipment in desert tortoise habitat over the 50-year term of the LCR MSCP. Small amounts of habitat suitable for desert tortoise could be removed as a result of non-Federal non-flow-related covered activities and implementation of the LCR MSCP Conservation Plan. However, the amount of habitat removal is expected to be minimal and is not expected to result in harm (i.e., injury or mortality of individuals). Measures to avoid and minimize direct mortality of tortoises and the removal of tortoise habitat are included in the conservation plan (conservation measures DETO1, DETO2, and AMM5). Federal actions addressed in the companion LCR MSCP BA (i.e., BIA-approved expansion of irrigated agricultural on tribal land) would result in more substantial impacts on desert tortoise habitat. These effects on desert tortoise are addressed in the LCR MSCP BA, and conservation measures to address these effects on desert tortoise are provided in the LCR MSCP Conservation Plan (conservation measures DETO1 and DETO2). All measures necessary to avoid and minimize take of desert tortoise by non-Federal entities have been included in the LCR MSCP Conservation Plan. These measures are practicable, and additional or alternative measures are not necessary.